April 6, 1876.

Dr. J. DALTON HOOKER, C.B., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read:—

I. "Experiments on the Friction between Water and Air." By Dr. RITTER VON LANG. Communicated by N. STORY MASKELYNE, F.R.S., Keeper of the Mineral Department, British Museum. Received February 28, 1876.

(Abstract.)

The method adopted for estimating the mutual friction of water and air consisted in connecting a glass tube of 8 centims. in length and 0·72 internal diameter with the pipes which supply Vienna with water at a pressure of four atmospheres. Arrangements for securing a vertical position for the tube ensure a perfectly continuous jet, devoid of any broken surface; and a glass tube surrounding this jet, with its axis coinciding with that of the jet, acts as an aspirator into and along which air is drawn through a lateral feeding-tube. The amount of this indrawn air corresponding to the fall of a given amount of water was determined by observing the rate at which a film of soap was borne along the feeding-tube; and the velocity of the water causing the indraught was calculated from the diameter of the water column and the quantity of water discharged along it in a given time; but after having once determined the form of the slightly conical water column, the amount of water discharged was the only datum required for the calculation.

The influence of a greater or less section of the air feeding-tube on the volume of the aspirated air was carefully determined, while also the absence of any appreciable retardation due to the soap film was established.

Neglecting the slightly conical character of the surface of the water column, and assuming (as the result of experiments in which the motion of a smoke cloud was observed) that the movement of the air was throughout in lines parallel to the axis of the tube along which it flowed, and showing that the pressure does not vary along the length of the tube, the author proceeds to discuss the hydrodynamic equations expressing the conditions of the problem (the motion of the air being uniform and independent of time), and represents the volume of air A passing through the tube in a second as :—

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$$A = W\left[\frac{R^2 - r^2}{2r^2(\log R - \log r)} - 1\right],$$

W being the weight of water, in grammes, discharged in a second, r the radius of the jet in turns of the micrometer-screw (6·8 turns of which correspond to 1 centim.), R being the radius of the aspirating tube.

The results obtained by observation accorded well with those given by this equation, so long as the value of R did not exceed the limit within which the suppositions regarding the motion of the air hold good.

The question was considered whether the results might not be brought into even closer accord with theory by the assumption that a slipping action takes place between the air and the water-jet on the one hand, and between the air and the tube on the other, instead of the assumption previously made that the air adhered alike to the water and to the tube in its passage. The result of the calculation, however, led to no nearer approximation; and, finally, experiments with other materials for the tube and other gases (namely, coal-gas and carbonic anhydride) were made, without resulting in any marked difference from the results obtained with air and glass.

II. "An Inquiry into the Cause of the slow Pulse in Jaundice." By J. Wickham Legg, M.D., Demonstrator of Morbid Anatomy in St. Bartholomew's Hospital. Communicated by J. Burdon Sanderson, M.D., Professor of Physiology in University College, London. Received February 24th, 1876.

It has long been known to physicians that the pulse of patients jaundiced and free from fever is often slow. But I am not acquainted with any definite investigation into this subject until about thirteen years ago, when Röhrig published his researches upon the influence of the bile upon the heart*. He was the first to find out that the bile-acids, not the pigments nor the cholestearin, had the power to render the pulse slow. He formed the opinion that this slow pulse was caused by a paralysis of the cardiac ganglia, because the pulse became slow after the injection of the bile-acids into the jugular vein, even when the vagi had been cut, and because the heart of the frog, cut out and plunged into a solution of bile-acids, beat a less number of times than when cut out and immersed in serum.

The following year Traube published an altogether different explanation†. It is well known that the bile-acids have the power of dissolving

* 'Arch. f. Heilkunde,' 1863, p. 385. Also in an Inaugural Dissertation, "Ueber den Einfluss der Galle auf die Herzthätigkeit," Leipzig, 1863.

† 'Berliner klinische Wochenschrift,' 1864, No. 9 and 15; also in 'Gesammelte Beiträge' (Berlin, 1871), Bd. i. p. 366.